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Patent Application

of

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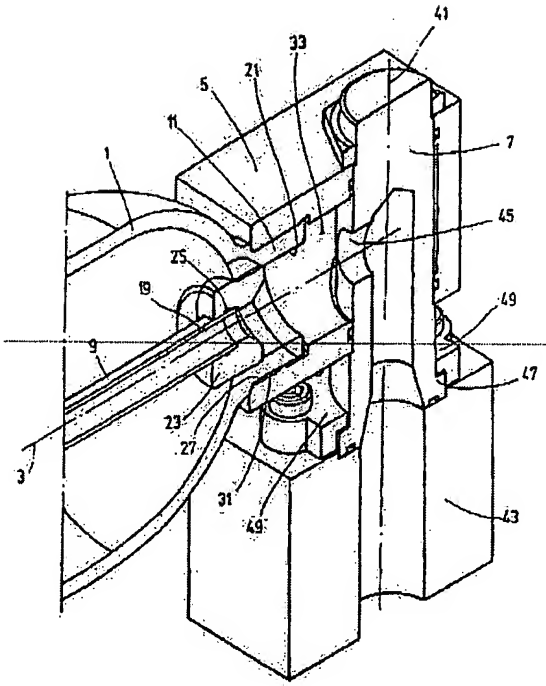
for

HYDRO DAMPER



(57) Abstract: Disclosed is a hydro damper for absorbing pressure oscillations and/or acoustic vibrations in systems which are operated by means of pressurized fluids. The inventive hydro damper is provided with a housing (1) having a leading dimension which defines a longitudinal axis (3) of the housing, a connection block (5) fluidically connecting the damper housing (1) to the corresponding system, and a linking device (7, 47, 49) which is assigned to the connection block (5) so as to mount the connection block (5), and consequently the damper housing (1), on the system in selected rotational positions relative to an axis of connection (41) that runs perpendicular to the longitudinal axis (3) of the housing.

(57) Zusammenfassung: Ein Hydrodämpfer zur Abschwächung von Druck- und/oder Schallschwingungen bei Systemen, zu deren Betrieb Druckfluide einsetzbar sind, weist auf: ein Dämpfergehäuse (1) mit einer eine Gehäuselängsachse (3) definierenden Hauptabmessung; einen Anschlussblock (5) für die Fluidverbindung des Dämpfergehäuses (1) mit dem betreffenden System und eine dem Anschlussblock (5) zugeordnete Verbindungseinrichtung (7, 47, 49) zum Anbringen des Anschlussblockes (5) und damit des Dämpfergehäuses (1) an dem System in wählbaren Drehstellungen, bezogen auf eine Verbindungsachse (41), die quer zur Gehäuselängsachse (3) verläuft.

~~*Reference is made for an explanation*~~Field of the ~~*two-letter*~~Invention

~~*codes and the other abbreviations to the Guidance Notes on Codes and Abbreviations in the front section of each regular PCT Gazette edition.*~~

~~Hydro Damper~~

The present invention relates to a hydro damper for attenuation of pressure oscillations and/or acoustic oscillations in systems which can use pressurized fluids for their operation.

Background of the Invention

In hydraulic systems, equipment-induced processes of varied types can ~~lead to~~cause pressure fluctuations, for example, due to the sudden connection of spaces with ~~a~~ different pressure level~~,~~s, due to actuation of cutoff and control fittings with short opening and closing times, ~~and~~ especially due to nonuniformities in the operation of positive-displacement pumps, in which pump pulsations arise, and ~~also~~ due to processes of turning positive-displacement pumps on and off.

Damper arrangements of varied designed are used to attenuate pressure fluctuations, periodic pressure oscillations or the resulting acoustic oscillations. ~~Thus, hydraulic~~ Hydraulic dampers can be based on the principle of hydropneumatic bladder-type and diaphragm accumulators, or can be made as reflection dampers (silencers).

The general prerequisite for the effectiveness of hydraulic dampers is that the damper housing encompasses a relatively large volume~~; this~~. This relatively large volume in turn leads to correspondingly large dimensions of the damper housing. In hydraulic systems ~~in~~ for installations in which only a limited installation space is available in the machinery room ~~which contains the~~ containing the hydraulic pump, ~~to the output of which~~ a hydraulic damper must be connected to the system output, which damper attenuates the pressure oscillations and acoustic

oscillations of the pump pulsation~~, problems~~. Problems frequently arise due to the space requirement of the hydraulic damper ~~which is~~ to be accommodated with a relatively high-volume damper housing. This problem arises to an increased degree in conjunction with hydraulic systems of injection molding systems, where good damper action at the output of the pertinent hydraulic pump can be required~~, but generally~~. Generally, only a very limited installation space is available for the high-volume damper housing.

~~The~~ Summary of the Invention

An object of the present invention is to provide a hydraulic damper with a construction ~~which enables~~enabling connection to ~~the pertinent~~a hydraulic system even with limited installation space and ~~a~~having a relatively large volume of the damper housing.

~~As claimed in the~~ According to the present invention, this object is attained by a hydraulic damper ~~as specified in claim 1~~ having

- a damper housing with a leading dimension ~~which defines~~ defining the longitudinal axis of the housing~~;~~
- ~~,~~ a connecting block for fluidic connection of the damper housing to the pertinent system~~,~~ and

a linking means ~~which is~~ assigned to the connecting block for mounting of the connecting block and ~~thus of~~ the damper housing on the system in selectable rotary positions~~,~~ relative to the connecting axis~~,~~ which ~~runs~~ axis extends transversely to the longitudinal axis of the housing.

~~In that, as specified in the~~Since the damper housing of the present invention~~, the damper housing~~ may be connected to the pertinent hydraulic system in the desired rotary position, the damper housing can be housed in the pertinent installation space in ~~an orientation~~ different orientations. The orientations can be selected such that the leading dimension of the damper housing extends in the direction ~~which~~ optimally ~~uses~~using the space. As a result, damper

housings in an elongated construction mode and with a comparatively large volume can be accommodated in

constricted machinery spaces. The possibility afforded by the present invention for selecting the rotary position of the damper housing around the connecting axis ~~which runs~~extending transversely to its longitudinal axis also enables direct connection, for example, at the output of the pertinent hydraulic pump. Even under constricted installation space conditions, for example, for hydraulic dampers of the reflection type~~,~~ in which a comparatively large volume of the damper housing is necessary, such damper can be directly connected to the pertinent hydraulic pump with the limited available installation space.

~~By preference~~ Preferably, the connecting axis to the leading dimension of the damper housing ~~which defines~~defining the longitudinal axis of the housing ~~runs~~ extends at least approximately vertically.

In one advantageous embodiment, the linking means has a pump connecting piece ~~which forms~~ forming the fluidic connection between the connecting block and a hydraulic pump ~~and which~~. Also, the connecting piece can be fixed at the output of the hydraulic pump in selectable rotary positions relative to the connecting axis.

If the output of the pump is provided for connection of linking parts according to the SAE standard, i.e., has a corresponding hole pattern for mounting screws, ~~provision~~ an annular body may be ~~made of the annular body~~ provided as the pump connecting piece of the linking means and attached to the output of the pump with a ring of holes ~~which is~~ located along the periphery of ~~said~~ that annular body. ~~Of these~~ These holes~~, those which correspond~~ corresponding to the desired rotary positions of the connecting block relative to the connecting axis can be selected for the engagement of mounting screws ~~which are~~ provided on the connecting block. In these embodiments, a connection of the hydraulic damper to the output of the pump is possible in

rotary steps ~~which correspond~~corresponding to the spacing of the holes of the ring of holes in the pump connecting piece.

If, on the other hand, the pump connecting piece has a round end flange which in the selected rotary position can be fixed relative to the connecting axis by ~~means of~~ a half ring-like SAE flange, clamping jaws ~~which~~ can be screwed to the SAE connecting parts of the output of the pump~~;~~ allowing continuous selection of rotary positions ~~is possible~~.

~~Reference will now be made to the accompanying drawings using the embodiments shown in the drawings, and in which:~~ Other objects, advantages and salient features of the present invention will become apparent from the following detailed description, which, taken in conjunction with the annexed drawings, discloses preferred embodiments of the present invention.

Brief Description of the Drawings

Referring to the drawings which form a part of this disclosure:

FIG. 1 ~~presents~~is a ~~diagram illustrating a~~ diagrammatic side elevational view of ~~one embodiment of the~~ a hydraulic damper ~~as claimed~~ according to a first embodiment in the present invention~~;~~;

FIG. 2 ~~presents a horizontal~~is an enlarged top plan view in section of the ~~embodiment from~~hydraulic damper of FIG. 1 ~~drawn on a larger scale compared to~~; and

~~• FIG. 1, and~~

~~FIG. 3~~ ~~presents~~ is a perspective ~~oblique~~ view of the end area of a ~~second embodiment of the~~ hydraulic damper ~~which is~~ connected to the output of ~~the~~ a hydraulic pump by ~~way of~~ an

SAE connection, ~~which view is~~ drawn on a larger scale and also dismantled and exploded, according to a second embodiment of the present invention.

Detailed Description of the Invention

FIGS. 1 and 2 show a first embodiment of the present invention, ~~namely~~ in the form of a reflection damper (silencer) having an elongated damper housing 1 with a leading dimension ~~which defines~~defining the longitudinal axis 3 of the housing. The damper housing 1 is fluidically connected or in fluid communication on its one end ~~which is~~, located on the right in the figures, to the connecting block 5 ~~which in~~. In turn, connecting block 5 is connected by ~~way of the~~ pump connecting piece 7 to the output of a hydraulic pump ~~which is~~ (not shown).

In ~~the~~ its capacity as a hydraulic damper of the reflection type, i.e., as a resonator with an interference action, the accumulator housing 1 contains a damping pipe 9. Dampening pipe 9 ~~which~~ extends coaxially to the longitudinal axis 3 between the entry end 11 and the exit end 13 of the damper housing 1. The damping pipe 9 in the area of its half length has slot openings 15 for coupling of the fluid oscillations in the damping pipe 9 to the fluid volume 17 surrounding it within the damper housing 1. The holes 19 constitute permanent ventilation of the space containing the volume 17 so that the hydraulic dampers need not be pre-charged for starting, because air accumulations are discharged by way of the holes 19.

On the entry end 11 and on the exit end 13, the damper housing has one inside thread 21 respectively, ~~into which screwed~~. Screwed pieces 23 are screwed ~~in the~~ into threads 21. An inner hole of ~~the~~each screwed ~~pieces which~~ piece is concentric to the longitudinal axis 3, and holds the ends of the damping pipe 9 ~~are held~~. The O-rings 25 ~~which sit~~sitting in the inner ~~hole~~ holes of the screwed pieces 23 elastically support the damping pipe 9 so that the pipe 9 does not produce any rattling noise in operation, without narrow tolerances being necessary.

On the entry end 11 and on the exit end 13 ~~there is~~, one outside thread 27 is respectively provided on the damper housing 1. A connecting flange 29 is screwed onto the outside thread 27 on the exit end 13 ~~in order~~ to produce the connecting link to a consumer, for example, by ~~means of~~ an SAE connecting means on a pressure hose or the like. With the outside thread 27 on the

entry end 11, the damper housing 1 is screwed to the connecting block 5~~, a~~. A threaded seal 31 ~~being~~ is provided on the outside thread 27. The connecting block 5, with its inner chamber 33 ~~which is~~ fluidically connected to the damper housing 1, forms a preliminary chamber for the resonator system ~~which is~~ located in the damper housing 1. With its bottom-side opening 35 the chamber 33 of the connecting block 5 is fluidically connected through the pump connection 7 to the output of the hydraulic pump ~~which is~~ (not shown).

As is apparent from FIG. 2, the connecting block 5 has four holes 37 for engagement of mounting screws ~~which are~~ (not shown ~~and with which~~). With the mounting screws, the connecting block 5 can be screwed to the pump connecting piece 7. The pump connecting piece 7 ~~which~~ is designed as an annular body in the embodiment from FIG. 1 and 2, and ~~which~~, for its part, can be linked to the output of the hydraulic pump~~, for purposes of~~. For interaction with the holes 37 on the connecting block 5, pump connecting piece 7 has a ring of holes 39 ~~which are~~ located on the same radius as the holes 37 of the connecting block 5 concentrically to a connecting axis 41 ~~which runs~~extending perpendicular to the longitudinal axis 3 of the housing ~~and which~~. Connecting axis 41 is defined by the center of the opening 35 ~~which links~~ linking the chamber 33 to the hydraulic pump. ~~Thus the~~ The connecting block 5 can be turned around or rotated about the connecting axis 41 ~~in order~~ to produce alignment between the desired holes 39 of the ring of holes on the pump connecting piece 7 with the holes 37 on the connecting block 5~~, so that the~~. The damper housing 1 can then be aligned with its longitudinal axis 3 to the desired rotary positions, relative to the connecting axis 41. When the damper housing 1 is mounted on the pertinent hydraulic pump, the longitudinal extension of the damper housing 1 may be turned or rotated into a position in which the utilization of space is optimal under the respective installation conditions. ~~In other words, this means that even~~ Even under difficult installation conditions, a damper housing 1 with a comparatively large volume can be accommodated.

While in the embodiments shown in FIGS. 1 and 2 the rotary position of the damper housing 1 can be set in rotary steps ~~which correspond~~corresponding to the spacing of the holes

39 on the periphery of the pump connecting piece 7 ~~which is~~ made as an annular body, the embodiment from FIG. 3 enables continuous setting of the rotary ~~position~~positions of the damper housing 1 around the connecting axis 41. For this purpose, in the second embodiment, the pump connecting piece 7 is not made as an annular body with a peripheral ring of holes~~, but~~. Rather, the pump connecting piece of the second embodiment is in the form of a circular cylindrical hollow body used as a fluid feed pipe ~~which~~. This fluid feed pipe produces the inner chamber 3 of the connecting block 5 connected with the output of the hydraulic pump~~, which~~. The hydraulic pump output is designated 43 and ~~which is suggested~~is illustrated schematically in FIG. 3. The hollow body of the pump connecting piece 7 ~~which~~ is concentric to the connecting axis 41 for the fluidic connection to the inner chamber 33 of the connecting block 5, and has a wall penetration or aperture 45 ~~which is~~ flush or coaxial with the longitudinal axis 3 of the damper housing 1.

On the open end ~~which projects~~projecting from the connecting block 5 and ~~which can be attached~~attachable to the pump output 43 for fluid entry, the pump connecting piece 7 has an end flange 47. By means of the half ring-shaped flange clamping jaws 49, as are common for connecting links according to the SAE standard (J 518), the pump connecting piece 7 can be fixed on the pump output 43. By turning the round end flange 47 of the pump connecting piece 7 within the clamping jaws 49 which annularly surround the end flange 47, the rotary position around the connecting axis 41 can be selected continuously, as desired.

~~It goes without saying that instead~~ Instead of the damper housing 1 ~~of~~being for a reflection damper ~~which is~~, as shown for the two embodiments, damper systems with a different mode of operation could be equally mounted on the connecting block 5~~, for~~. For example, hydraulic dampers ~~which are based on the principle~~can be in the form of hydropneumatic bladder-type and diaphragm accumulators.

The hydraulic damper ~~as claimed in~~of ~~the~~the present invention can be ~~delivered in the manner of~~ provided as original equipment for a specific type of a plastic injection molding machine. Depending on space conditions on the respective machine, preferred holes on the pump connecting piece are provided over the existing hole pattern~~, and with~~. With subsequent

deliveries, a complex hole pattern on the pump connecting piece can then be dispensed with. ~~In fact it is then possible to select a~~ A certain hole pattern can be selected in which the pertinent hydraulic damper assumes the desired position for the machine type provided for it on a plastic injection molding machine.

~~Claims~~

~~1. Hydro damper for attenuation of pressure oscillations and/or acoustic oscillations in systems which are operated by means of pressurized fluids, of the type comprising:~~

~~a~~

While various embodiments have been chosen to illustrate the invention, it will be understood by those skilled in the art that various changes and modifications can be made therein without departing from the scope of the invention as defined in the appended claims.

What is claimed is:

HYDRO DAMPER

Abstract of the Disclosure

A hydro damper absorbs pressure oscillations and/or acoustic vibrations in systems which are operated by pressurized fluids. The hydro damper is provided with a housing (1) ~~with~~having a leading dimension which defines ~~the~~ a longitudinal axis (3) of the housing~~;~~

~~,~~ a ~~connecting block (5) for fluidic~~ connection ~~of~~ block (5) fluidically connecting the damper housing (1) to the ~~pertinent~~corresponding system, and

a linking ~~means~~device (7~~) which is~~, 47, 49) assigned to the ~~connecting~~ connection block (5~~) for mounting of~~). The linking device mounts the ~~connecting~~ connection block (5~~)~~), and ~~thus of~~consequently the damper housing (1~~)~~), on the system in ~~selectable rotary~~selected rotational positions~~,~~ relative to ~~the connecting~~ an axis of connection (41) ~~which runs transversely~~extending perpendicular to the longitudinal axis (3) of the housing.

~~2. Hydraulic damper as claimed in claim 1, wherein the connecting axis (41) to the longitudinal axis (3) of the housing runs at least approximately at a right angle.~~

~~3. Hydraulic damper as claimed in claim 1 or 2, wherein the linking means has a pump connecting piece (7) which forms the fluidic connection between the connecting block (5) and a hydraulic pump and which can be fixed at the output (43) of the hydraulic pump in selectable rotary positions relative to the connecting axis (41).~~

~~4. Hydraulic damper as claimed in claim 3, wherein the pump connecting piece (7) has an annular body which can be attached to the output (43) of the pump with a ring of holes (39)~~

~~which is located along its periphery, of these holes, those which correspond to the desired rotary positions of the connecting block (5) relative to the connecting axis (41) can be selected for the engagement of mounting screws which are provided on the connecting block (5).~~

~~5. Hydraulic damper as claimed in claim 3, wherein the pump connecting piece (7) is designed for mounting on the output (43) of the pump, which output has connecting parts for forming an SAE standard flange connection, and wherein the pump connecting piece (7) has a round end flange (47) which in the selected rotary position can be fixed relative to the connecting axis (41) by means of half ring-like SAE flange clamping jaws (49) which can be screwed to the SAE connecting parts of the output (43) of the pump.~~

~~6. Hydraulic damper as claimed in any of claims 1 to 5, wherein the connecting block (5) has an inner chamber (33) with an outflow opening which extends concentrically to the longitudinal axis (3) of the housing and which is connected to the input (11) of the damper housing (1), and wherein as the pump connecting piece (7) there is a circular cylindrical hollow body which extends concentrically to the connecting axis (41) and perpendicular to the longitudinal axis (3) of the housing into the chamber (33) of the connecting block (5) and which is used as a fluid feed pipe and has a wall penetration (45) which is concentric to the longitudinal axis (3) of the housing for fluidic connection to the inner chamber (33) of the connecting block (5).~~

~~7. Hydraulic damper as claimed in claim 6, wherein the damper housing (1) contains a fluid silencer (9) of the reflection type through which the pressurized fluid which is to be damped may flow.~~

~~8. Hydraulic damper as claimed in claim 7, wherein the inner chamber (33) of the connecting block (5) which is connected to the input (11) of the fluid silencer (9) is provided as the pre-chamber of the fluid silencer (9).~~

1 / 2

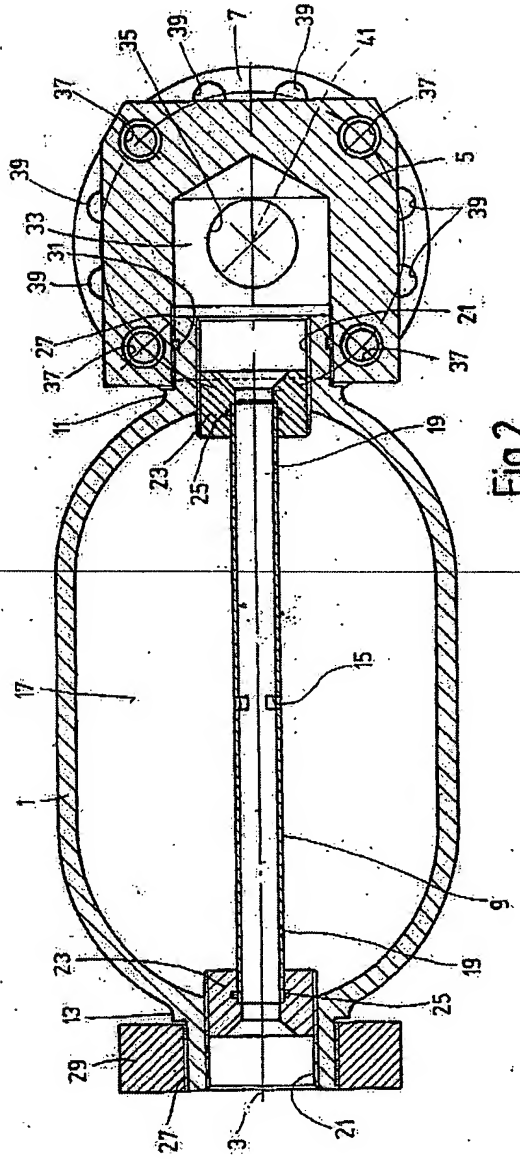


Fig.2

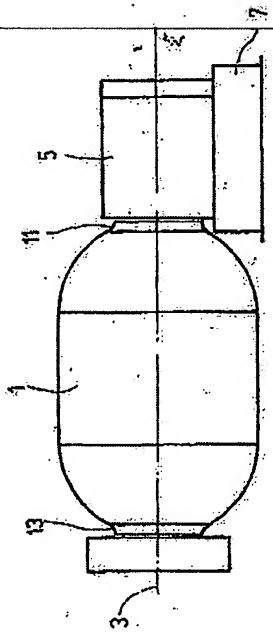


Fig.1

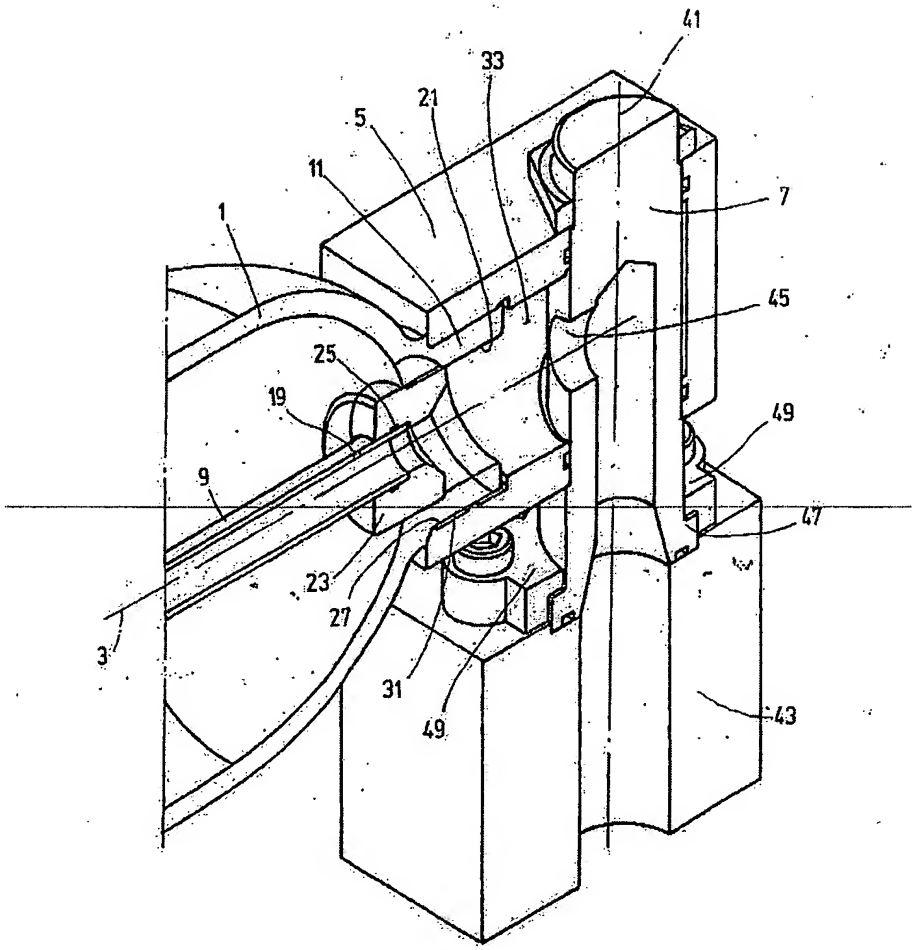


Fig.3